No. 200400061

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Minnesota Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

*WHEAT, COMMON*

*'Oklee'*

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of Washington, D.C. this twenty-sixth day of July, in the year two thousand and five.*

*Attest:*

*Commissioner*
*Plant Variety Protection Office*
*Agricultural Marketing Service*

*Secretary of Agriculture*

REPRODUCE LOCALLY. *Include form number and date on all reproductions* — Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

**APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE**
*(Instructions and information collection burden statement on reverse)*

*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.*

*Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF OWNER
Minnesota Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
MN95002-A

3. VARIETY NAME
Oklee

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
277 Coffey Hall
1420 Eckles Ave.
University of Minnesota
St. Paul, MN 55108

5. TELEPHONE *(include area code)*
(612) 624-2299

6. FAX *(include area code)*
(612) 625-1260

FOR OFFICIAL USE ONLY

PVPO NUMBER
20 0400061

FILING DATE
Dec. 22, 2003

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
University

8. IF INCORPORATED, GIVE STATE OF INCORPORATION

9. DATE OF INCORPORATION

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
James A. Anderson
Dept. of Agronomy & Plant Genetics
411 Borlaug Hall
1991 Buford Circle
University of Minnesota
St. Paul, MN 55108

FEES RECEIVED
FILING AND EXAMINATION FEES:
$ 3652.00
DATE 12-22-2003
CERTIFICATION FEE:
$ 432.00
DATE 2/03/2005

11. TELEPHONE *(Include area code)*
(612) 625-9763

12. FAX *(Include area code)*
(612) 625-1268

13. E-MAIL
ander319@umn.edu

14. CROP KIND *(Common Name)*
Wheat

16. FAMILY NAME *(Botanical)*
Gramineae

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (*OPTIONAL*)
☐ YES ☑ NO
IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERICALIZATION. _____

19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
(Follow instructions on reverse)
- a. ☑ Exhibit A. Origin and Breeding History of the Variety
- b. ☑ Exhibit B. Statement of Distinctness
- c. ☑ Exhibit C. Objective Description of Variety
- d. ☑ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☑ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☑ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☑ YES *(If "yes", answer items 21 and 22 below)* ☐ NO *(If "no", go to item 23)*

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?
☑ YES ☐ NO
IF YES, WHICH CLASSES? [9] FOUNDATION [1] REGISTERED [1] CERTIFIED

22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☑ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
[9] FOUNDATION [1] REGISTERED [1] CERTIFIED
*(If additional explanation is necessary, please use the space indicated on the reverse.)*

23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☑ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☑ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

| SIGNATURE OF OWNER | SIGNATURE OF OWNER |
|---|---|
| Beverly R Durgan | Beverly R Durgan |
| NAME *(Please print or type)* Beverly R. Durgan | NAME *(Please print or type)* Beverly R. Durgan |
| CAPACITY OR TITLE: Associate Dean | DATE: 12/18/2003 |
| CAPACITY OR TITLE: Associate Dean | DATE: 12/18/2003 |

*(See reverse for instructions and information collection burden statement)*

ST-470 (04-03) designed by the Plant Variety Protection Office using Word 2002.

INSTRUCTIONS

20 040061

**GENERAL:** To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $3,652 ($432 filing fee and $3,220 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

**Plant Variety Protection Office**
**Telephone: (301) 504-5518**
**FAX: (301) 504-5291**
**Homepage:** http://www.ams.usda.gov/science/pvpo/pvp.htm

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that name has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, 10301 Baltimore Avenue, Suite 401 NAL Building, Beltsville, MD 20705. Telephone: (301) 504-5682 http://www.ams.usda.gov/lsg/seed.htm.

**ITEM**

19a. Give:
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

20. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

23. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

24. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

**22. CONTINUED FROM FRONT** *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

Two generations of Certified Seed production are allowed under emergency situations with the consent of the originating breeder or institution.

**23. CONTINUED FROM FRONT** *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

First date of sale was March 17, 2003 in U.S. for certified seed production.

**24. CONTINUED FROM FRONT** *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

**NOTES:** It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

# EXHIBIT A – ORIGIN AND BREEDING HISTORY

## 'OKLEE'

***Selection Criteria:***

Pedigree: Pioneer 2375/SBF0670

Cross and F1 generation handled by personnel with the former Hard Red Spring Wheat Breeding program Pioneer Hi-Bred Company. This was part of the material gifted to the University of Minnesota/USDA-ARS breeding program.

1993: F2 space-plant population population; University of Minnesota research land; segregating for maturity, plant height, and disease resistance, leaf and stem rust resistant plants selected; F3 single seed descent generation advance, University of Minnesota greenhouse. No selection applied.

1994: F4 head row (F3-derived); University of Minnesota research land; selected based on appropriate plant height, maturity, and leaf and stem rust resistance.

1995: F5 seed increase (increase of seed from a single spike from the F4 row); Arizona winter; no segregation observed within the single row.

1996: F6 Preliminary Yield Trial (tested as MN95002); University of Minnesota research land; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, grain protein content, test weight, grain yield, milling and baking quality; no segregation noted.

1997: F7 Advanced Yield Trial, University of Minnesota research land; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; no segregation noted.

1998: Statewide Variety Trial (7 locations), University of Minnesota research land; Uniform Regional Performance Nursery; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; no segregation noted.

1999: Statewide Variety Trial (7 locations), University of Minnesota research land, Uniform Regional Performance Nursery; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; Approximately 1% tall plants observed. 100 random heads selected for purification and grown in Arizona winter nursery, 80 rows were selected based on uniformity of height among and within rows.

2000: Statewide Variety Trial (7 locations), University of Minnesota research land, selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; the 80 head selection harvested from Arizona were evaluated for uniformity and reaction to leaf rust, stem rust, and Fusarium head blight; 19 of the 80 selections were discarded to due later heading and/or shorter plant height. The remaining 61 selections were harvested and equal amounts of seed of each were bulked together and designated as MN95002-A

2001: Statewide Variety Trial (7 locations) including both MN95002 and MN95002-A, University of Minnesota research land; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; 1,000 kg of breeder seed produced by Minnesota Crop Improvement Association.

2002: Statewide Variety Trial (7 locations), University of Minnesota research land; selected based on appropriate plant height, maturity, field resistance to leaf and stem rust, Fusarium head blight resistance, grain protein content, test weight, grain yield, milling and baking quality; approximately 100,000 kg of foundation seed was produced by Minnesota Crop Improvement Association via a winter nursery in California and 4 Minnesota locations.

2003: MN95002-A released as 'Oklee'.

***Evidence of Uniformity and Stability:***

Oklee has been stable since purification and formation of MN95002-A in 2000. Approximately 3 in 10,000 plants are more than 10 cm taller. The frequency of tall plants varies somewhat with the environmental conditions, but has not exceeded 5 in 10,000. these tall plants are variants. MJH 10/12/0

## EXHIBIT B. – NOVELTY STATEMENT

Oklee is most similar to 2375. Oklee differs from 2375 in having the 17+18 high molecular weight subunit at the *Glu*-1B locus. The high molecular weight glutenin alleles are summarized in Table 1 below and shown in attached Figure 1.

Table 1. High molecular weight glutenin allele composition of 'Oklee' and '2375'. Allele nomenclature is according to Payne et al. 1980. Theor. Appl. Genet. 58:113-120.

| | Chromosome | | |
|---|---|---|---|
| Variety | 1A | 1B | 1D |
| Oklee | 2* | 17+18 | 5+10 |
| 2375 | 2* | 7+8 | 5+10 |

# Exhibit B. – Novelty Statement, cont.

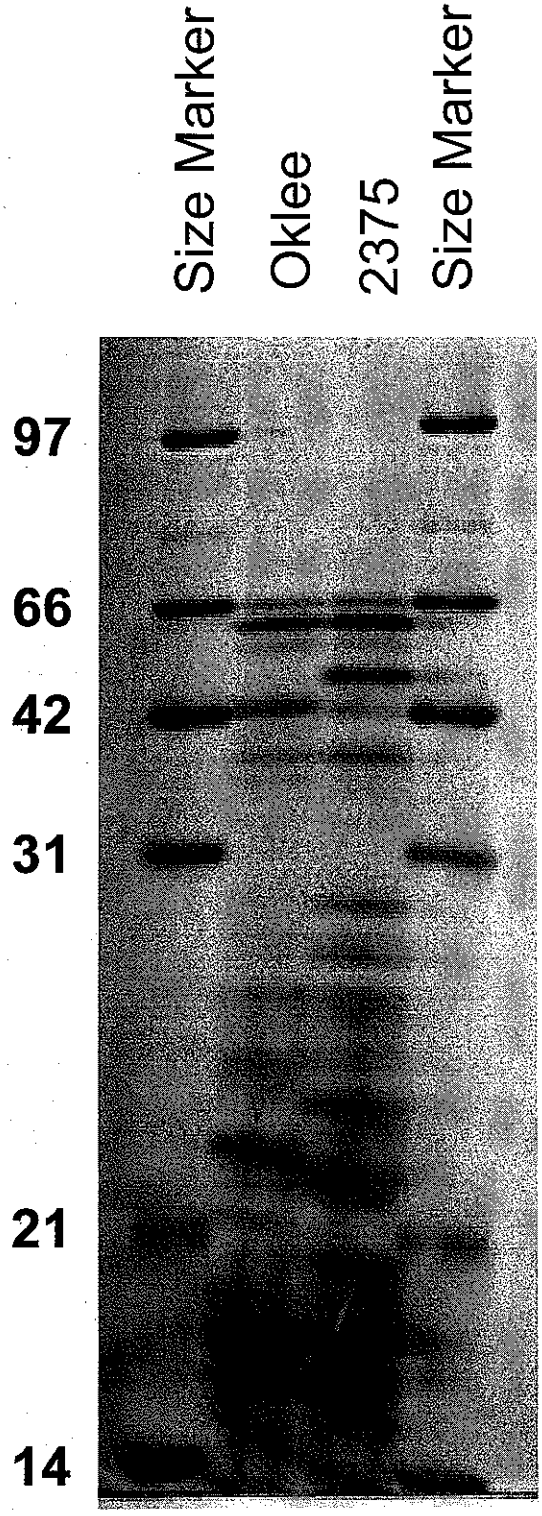


Figure 1a. SDS-PAGE gel of high molecular weight glutenins of 'Oklee' and '2375". Lanes are flanked by size markers. Molecular weights (x $10^3$) of marker bands are given on the left side.

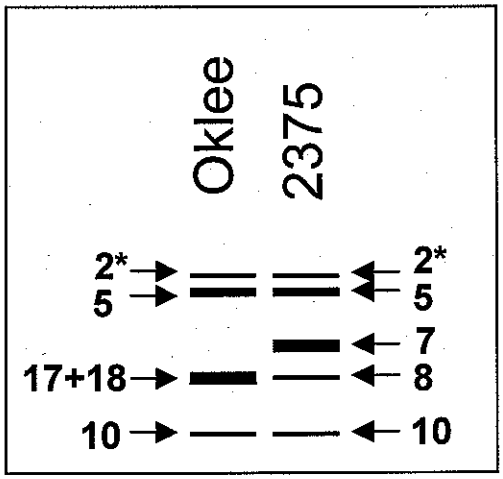


Figure 1b. Cartoon of Fig. 1a. with alleles of the high molecular weight glutenin bands labeled according to Payne et al. 1980. Theor. Appl. Genet. 58:113-120.

# Exhibit B. – Novelty Statement. Addendum

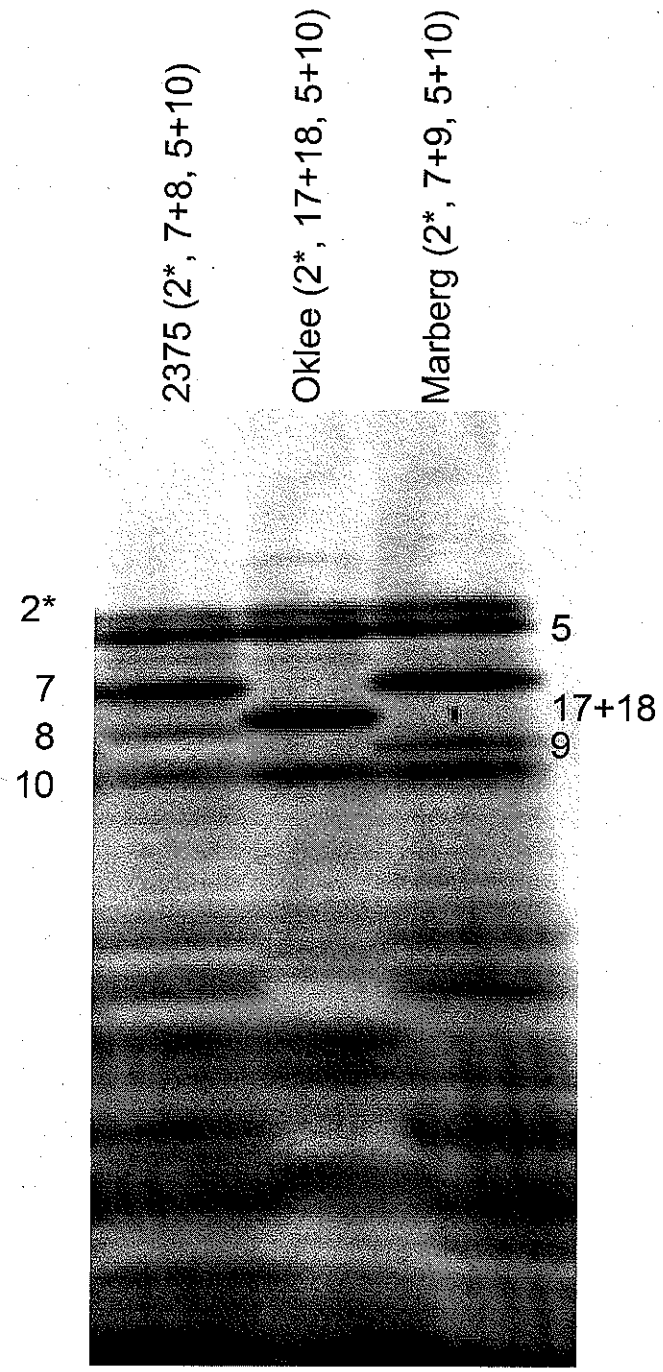


Fig. 1c. SDS-PAGE gel of high molecular weight glutenins of '2375', 'Oklee' and 'Marberg'. Band designations according to Theor. Appl. Genet. 58:113-120 are given next to each band.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(*Wheat*)

# OBJECTIVE DESCRIPTION OF VARIETY
## WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)
Minnesota Agricultural Experiment Station

ADDRESS (*Street and No. or R.F.D. No., City, State, and Zip Code*)
277 Coffey Hall
1420 Eckles Ave.
University of Minnesota
St. Paul, MN 55108

**FOR OFFICIAL USE ONLY**

PVPO NUMBER 20 0400061

VARIETY NAME

TEMPORARY OR EXPERIMENTAL DESIGNATION

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [ ][ ][ ] or [ ][ ]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: _____.

**Please answer all questions for your variety; lack of response may delay progress of your application.**

1. **KIND:**

[1] 1=Common 2=Durum 3=Club 4=Other (SPECIFY) _____

2. **VERNALIZATION:**

[1] 1=Spring 2=Winter 3=Other (SPECIFY) _____

3. **COLEOPTILE ANTHOCYANIN:**

[1] 1=Absent 2=Present

4. **JUVENILE PLANT GROWTH:**

[3] 1=Prostrate 2=Semi-erect 3=Erect

5. **PLANT COLOR (boot stage):**

[2] 1 = Yellow-Green 2 = Green 3 = Blue-Green

6. **FLAG LEAF (boot stage):**

[2] 1 = Erect 2 = Recurved [2] 1 = Not Twisted 2 = Twisted

7. **EAR EMERGENCE:**

[0][1] Number of Days Earlier Than 2375 *

[0][0] Number of Days Later Than Forge *

8. **ANTHER COLOR:**

[1] 1 = YELLOW 2 = PURPLE

9. **PLANT HEIGHT (from soil to top of head, excluding awns):**

[0][0] cm Taller Than Oxen *

[0][3] cm Shorter Than 2375 *

20 0400061

10. STEM:

A. ANTHOCYANIN

[1] 1= Absent 2=Present

B. WAXY BLOOM

[2] 1=Absent 2=Present

C. HAIRINESS (last internode of rachis)

[1] 1=Absent 2=Present

D. INTERNODE (SPECIFY NUMBER) _____

[1] 1=Hollow 2=Semi-solid 3=Solid

E. PEDUNCLE

[2] 1=Absent 2=Present

[13] cm Length

11. HEAD (at Maturity):

A. DENSITY

[2] 1=Lax 2=Middense 3= Dense

B. SHAPE

[1] 1 = Tapering 2= Strap 3 = Clavate 4 = Other (SPECIFY) _____

C. CURVATURE

[2] 1 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned

12. GLUMES (at Maturity):

A. COLOR

[1] 1 = White 2 = Tan 3 = Other (SPECIFY) _____

B. SHOULDER

[6] 1 = Wanting 2 = Oblique 3 = Rounded 4 = Square 5 = Elevated 6 = Apiculate

C. BEAK

[3] 1 = Obtuse 2 = Acute 3 =Acuminate

D. LENGTH

[1] 1 = Short (ca. 7mm) 2 = Medium (ca. 8mm) 3 = Long (ca. 9mm)

E. WIDTH

[1] 1 = Narrow (ca. 3mm) 2 = Medium (ca. 3.5mm) 3 = Wide (ca. 4mm)

13. SEED:

A. SHAPE

[1] 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

[2] 1=Rounded 2=Angular

C. BRUSH

[2] 1=Short 2=Medium 3=Long

[1] 1 = Not Collared 2 = Collared

D. CREASE

[1] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[2] 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

13. **SEED:** (continued)

**E. COLOR**

[3] 1 = White 2 = Amber 3 = Red 4 = Other (SPECIFY) _____

**F. TEXTURE**

[1] 1=Hard 2=Soft

**G. PHENOL REACTION** *(see instructions)*:

[ ] 1 = Ivory 2 = Fawn 3 = Light Brown 4 = Dark Brown 5 = Black

14. **DISEASE:** (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

**PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED**

**Stem Rust** *(Puccinia graminis* f. sp. *tritici)*
[2] Mixture of races

**Stripe Rust** *(Puccinia striiformis)*
[0]

**Tan Spot** *(Pyrenophora tritici-repentis)*
[3] Pti 2

**Halo Spot** *(Selenophoma donacis)*
[0]

***Septoria nodorum*** **(Glume Blotch)**
[3] mixture of Isolates

***Septoria avenae*** **(Speckled Leaf Disease)**
[0]

***Septoria tritici*** **(Speckled Leaf Blotch)**
[3] mixture of isolates

**Scab** (*Fusarium* spp.)
[3] Mixture of ~~races~~ isolates

**"Black Point" (Kernel Smudge)**
[2] Natural Infection

**Barley Yellow Dwarf Virus (BYDV)**
[0]

**Soilborne Mosaic Virus (SBMV)**
[0]

**Wheat Yellow (Spindle Streak) Mosaic Virus**
[0]

**Wheat Streak Mosaic Virus (WSMV)**
[0]

**Other (SPECIFY)** _____
[ ]

**Other (SPECIFY)** _____
[ ]

**Other (SPECIFY)** _____
[ ]

**Leaf Rust** *(Puccinia recondita* f. sp. *tritici)*
[3] Mixture of races

**Loose Smut** *(Ustilago tritici)*
[0]

**Flag Smut** *(Urocystis agropyri)*
[0]

**Common Bunt** *(Tilletia tritici* or *T. laevis)*
[0]

**Dwarf Bunt** *(Tilletia controversa)*
[0]

**Karnal Bunt** *(Tilletia indica)*
[0]

**Powdery Mildew** *(Erysiphe graminis* f. sp. *tritici)*
[0]

**"Snow Molds"**
[0]

**Common Root Rot** *(Fusarium, Cochliobolus* and *Bipolaris* spp.)
[0]

**Rhizoctonia Root Rot** *(Rhizoctonia solani)*
[0]

**Black Chaff** *(Xanthomonas campestris* pv. *translucens)*
[2] Natural Infection

**Bacterial Leaf Blight** *(Pseudomonas syringae* pv. *syringae)*
[2] Natural Infection

**Other (SPECIFY)** _____
[ ]

**Other (SPECIFY)** _____
[ ]

**Other (SPECIFY)** _____
[ ]

**Other (SPECIFY)** _____
[ ]

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

| | |
|---|---|
| Hessian Fly *(Mayetiola destructor)* [0] _____ | Other (SPECIFY) _____ [ ] _____ |
| Stem Sawfly *(Cephus* spp.) [0] _____ | Other (SPECIFY) _____ [ ] _____ |
| Cereal Leaf Beetle *(Oulema melanopa)* [0] _____ | Other (SPECIFY) _____ [ ] _____ |
| Russian Aphid *(Diuraphis noxia)* [0] _____ | Other (SPECIFY) _____ [ ] _____ |
| Greenbug *(Schizaphis graminum)* [0] _____ | Other (SPECIFY) _____ [ ] _____ |
| Aphids [0] _____ | Other (SPECIFY) _____ [ ] _____ |

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

# EXHIBIT D. – ADDITIONAL DESCRIPTION OF VARIETY

**Table 1. Agronomic Characteristics of Oklee and selected checks (2001-2002), 13 environments.**

| Variety | Origin | Days to Heading | Height cm | Straw strength | Test Weight Lb/Bu | Protein % |
|---|---|---|---|---|---|---|
| 2375 | PI 1988 | 60.4 | 78 | medium | 59.9 | 14.7 |
| ALSEN | ND 2000 | 60.8 | 78 | strong | 60.4 | 15.6 |
| FORGE | SD 1997 | 59.1 | 80 | strong | 60.3 | 14.4 |
| HJ98 | MN 1998 | 62.1 | 75 | medium | 58.2 | 14.5 |
| INGOT | SD 1998 | 58.8 | 87 | m. strong | 61.3 | 14.9 |
| IVAN | AP 1998 | 63.3 | 75 | v. strong | 59.2 | 14.0 |
| KNUDSON | AP 2001 | 60.8 | 76 | m. strong | 59.9 | 14.6 |
| **Oklee** | **MN** | **59.1** | **75** | **medium** | **60.9** | **15.1** |
| OXEN | SD 1996 | 59.7 | 75 | m. strong | 58.7 | 14.8 |
| PARSHALL | ND 1999 | 60.6 | 85 | strong | 61.2 | 15.1 |
| REEDER | ND 1999 | 60.5 | 79 | strong | 59.4 | 14.7 |
| RUSS | SD 1995 | 60.8 | 80 | m. strong | 58.7 | 14.3 |
| VERDE | MN 1995 | 63.1 | 76 | m. strong | 58.9 | 14.6 |
| WALWORTH | SD 2001 | 59.3 | 79 | medium | 59.0 | 14.9 |
| Mean | | 60.6 | 78.4 | | 59.7 | 14.7 |

**Table 1. Small plot quality comparisons of Oklee with selected checks, 1998-2000.[1,2]**

| VARIETY | 1,000 Kernel wt. mg | Large kernels % | NIR Hardness | Wheat Protein % | Mixing Abs % | Mixing Pattern 1-10 | Mixing Time min. | Baking Abs % | Loaf Volume cc |
|---|---|---|---|---|---|---|---|---|---|
| 2375 | 33.6 | 69 | 75 | 14.4 | 56.3 | 2.8 | 2.6 | 59.4 | 196 |
| HJ98 | 28.1 | 41 | 63 | 14.0 | 55.4 | 2.9 | 3.7 | 58.9 | 201 |
| Ingot | 31.1 | 66 | 75 | 15.3 | 56.6 | 3.0 | 3.0 | 59.1 | 203 |
| Oklee | 31.6 | 67 | 70 | 15.3 | 56.0 | 1.8 | 2.3 | 58.8 | 204 |
| Oxen | 29.5 | 62 | 80 | 14.8 | 57.1 | 3.3 | 3.4 | 59.9 | 203 |

1. Data are an average of 12 samples: a composite of three 1998 Northern locations; a composite of three 1998 Southern locations; a composite of three 1999 Southern locations; a composite of three 2000 Southern locations; and 1999 and 2000 samples from Stephen, Roseau, Crookston, and Morris. All data are from the USDA/ARS Grain Quality Lab in Fargo.
2. Higher numbers are desirable for all traits, except mixing time where a low to intermediate number is preferred, assuming good mixing tolerance.

**Table 2. Small plot quality comparisons of Oklee with selected checks, 2002.[1,2]**

| Cultivar | 1,000 Kernel wt. mg | Large kernels % | NIR Hardness | Wheat Protein % | Flour Protein % | Mixing Abs (%) | Mixing Pattern 1-10 | Mixing Time (min) | Rating Scores[3] DC | CC | CG | CT | Loaf Vol cc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2375 | 32.2 | 59.4 | 75.9 | 13.8 | 12.6 | 56.7 | 3.2 | 5.1 | 2.8 | 3.8 | 3.2 | 4.2 | 180 |
| HJ98 | 28.7 | 36.4 | 59.7 | 13.7 | 12.4 | 56.8 | 4.0 | 8.6 | 2.8 | 4.6 | 3.2 | 4.4 | 199 |
| Ingot | 28.6 | 51.4 | 73.0 | 14.2 | 13.3 | 57.9 | 4.0 | 5.6 | 2.8 | 4.4 | 3.2 | 5.2 | 199 |
| Oklee | 31.8 | 56.2 | 69.5 | 14.3 | 13.8 | 57.9 | 2.6 | 3.9 | 2.8 | 3.6 | 3.6 | 4.8 | 199 |
| Oxen | 29.2 | 54.2 | 78.1 | 13.3 | 12.0 | 56.4 | 3.2 | 7.0 | 2.6 | 4.2 | 2.8 | 4.4 | 196 |

1. Data are an average of 5 samples from Crookston, Lamberton, Morris, Roseau, and St. Paul.
2. Higher numbers are desirable for all traits, except mixing time where a low to intermediate number is preferred,
3. DC=dough characteristics; CC=crumb color; CG=crumb grain; CT=crumb texture; higher numbers are better except for DC when 3 is best.

**Table 3. Quality comparisons of 'Oklee' with 'Grandin' checks in the 1999 and 2000 Wheat Quality Council Trials.[1]**

| | Flour Extraction (%) | | Test | Wheat | Flour | Flour | Farinograph | Bake | | Mix | Loaf | Crumb | | | Overall |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1999 Crookston** | 0.46% ash flour | Straight grade flour | Weight lbs/bu | Protein % | Protein % | Ash % | water abs % | Abs 1–5 | Mix Time 1–5 | Tolerance 1–5 | Volume 1–5 | Color 1–5 | Grain 1–5 | Texture 1–5 | Rating 1–5 |
| Grandin 1 (check) | 53.0 | 74.5 | 57.7 | 12.8 | 11.9 | 0.49 | 58.4 | 3.4 | 4.4 | 4.4 | 4.0 | 3.9 | 4.3 | 4.2 | 4.1 |
| Grandin 2 (check) | 58.1 | 74.3 | 57.7 | 12.9 | 11.7 | 0.49 | 58.5 | 3.3 | 4.0 | 4.0 | 3.6 | 3.7 | 4.3 | 4.2 | 3.7 |
| Oklee | 69.2 | 73.4 | 57.6 | 13.0 | 12.1 | 0.44 | 58.1 | 3.1 | 3.5 | 3.5 | 3.6 | 3.9 | 3.5 | 3.7 | 3.4 |
| **2000 Casselton** | 0.40% | | | | | | | | | | | | | | |
| Grandin 1 (check) | 34 | 72 | 62.0 | 12.7 | 12.1 | 0.55 | 60.6 | 3.5 | 4.6 | 4.3 | 4.0 | 4.4 | 4.2 | 4.1 | 4.0 |
| Grandin 2 (check) | 43 | 73 | 62.4 | 14.4 | 13.6 | 0.56 | 62.8 | 4.4 | 3.9 | 4.0 | 4.6 | 4.0 | 3.8 | 3.9 | 4.0 |
| Oklee | 43 | 70 | 64.6 | 14.4 | 13.4 | 0.50 | 61.9 | 3.8 | 2.9 | 3.0 | 3.8 | 3.5 | 3.0 | 3.7 | 3.3 |
| **2000 Crookston** | 0.40% | | | | | | | | | | | | | | |
| Grandin 1 (check) | 28 | 74 | 62.3 | 15.5 | 14.6 | 0.60 | 64.6 | 4.7 | 3.7 | 3.7 | 4.4 | 4.3 | 4.0 | 4.2 | 3.9 |
| Grandin 2 (check) | 39 | 72 | 60.7 | 16.1 | 15.0 | 0.53 | 64.1 | 4.7 | 4.5 | 4.6 | 4.6 | 4.5 | 4.3 | 4.3 | 4.2 |
| Oklee | 49 | 72 | 60.7 | 15.7 | 14.8 | 0.50 | 64.6 | 4.2 | 3.0 | 2.5 | 3.8 | 3.5 | 2.7 | 3.3 | 3.2 |

[1] Higher numbers are desirable for all traits, except flour ash, and mixing time where a low to intermediate number is preferred, assuming good mixing tolerance. The samples were milled on the Miag Pilot Mill by the USDA-ARS Wheat Quality Laboratory in Fargo, ND. Mixing/baking parameters are averages of 11 cooperators that included State, Federal, and Private labs.

## EXHIBIT E – STATEMENT OF THE BASIS OF THE APPLICANT'S OWNERSHIP

Dr. James A. Anderson, an employee of the University of Minnesota is the lead plant breeder who developed 'Oklee' the hard red spring wheat cultivar for which Plant Variety Protection is hereby sought. The employee by agreement and because of the condition of the use of facilities and funds of the University of Minnesota has assigned all ownership right to 'Oklee' hard red spring wheat to the University of Minnesota.